

AMENDMENTS TO THE CLAIMS

The following list of claims replaces all prior listings and versions of claims in this application:

1. (Currently amended) A method for providing a smooth wafer surface comprising:
formulating an abrasive mixture by mixing diamond particles and silica particles in a solution ~~based on~~, such that the formulation is sufficient for smoothing a polar material surface that is polished therewith, wherein the abrasive mixture has a predetermined diamond/silica volume ratio that is selected to control and obtain a desired surface roughness of the polished polar material surface; and
polishing a surface of the wafer with the abrasive mixture to obtain ~~a desired smooth wafer surface~~ a desired roughness that is sufficient for molecular bonding to another polished substrate face.
2. (Original) The method according to claim 1 further comprising bonding the smooth wafer surface to at least one other wafer to form a multilayer structure.
3. (Currently amended) A method according to claim 1 wherein the wafer comprises a the polar material.
4. (Original) A method according to claim 3 wherein the material is a semiconductor material.
5. (Original) A method according to claim 4 wherein the material is silicon carbide.
6. (Original) The method according to claim 4 wherein the predetermined volume ratio is 0.29 to 0.35.

7. (Original) The method according to claim 6 wherein the predetermined volume ratio is 0.3 to 0.33.
8. (Original) The method according to claim 4 wherein the silica is a colloidal silica and the diamond particles have a grain size of between about 0.6 and 0.9 μm .
9. (Original) A method according to claim 8 wherein the polishing is conducted with a polishing head rotating at between about 10 to 100 rpm and a polishing turntable also rotating at about 10 to 100 rpm.
10. (Original) A method according to claim 8 wherein the polishing is conducted with a polishing head rotating at between about 35 to 65 rpm and a polishing turntable also rotating at about 35 to 65 rpm.
11. (Original) A method according to claim 9 wherein the polishing head and turntable rotate at essentially the same speed.
12. (Original) A method according to claim 9 wherein the polishing head is pressed against the wafer surface with a force of about 10 to 50 daN.
13. (Original) A method according to claim 9 wherein the polishing head is pressed against the wafer surface with a force of about 7 to 15 daN.
14. (Currently amended) A method according to claim 8 wherein the surface is provided by transferring a layer from the wafer to expose said surface, and the polishing is performed for a duration of about 30 minutes to 2 hours.
15. (Cancelled)
16. (Original) A method according to claim 5 wherein polishing is performed on at least one of the Si face of the wafer or the C face of the wafer.

17. (Original) A method according to claim 1 further comprising final cleaning to avoid crystallization of abrasive agents on the wafer surface.

18. (New) The method of claim 1, further comprising performing an ultrafinishing polishing on the polished surface to improve the surface sufficiently for molecular bonding to another polished substrate surface.

19. (New) The method of claim 18, wherein the ultrafinishing polishing comprises polishing the polished surface with pure colloidal silica.

20. (New) The method of claim 1, further comprising providing the surface by transferring a layer from the wafer to expose said surface.

21. (New) The method of claim 1, wherein the diamond/silica volume ratio is selected to substantially minimize the roughness of the polished surface.

22. (New) A method for providing a smooth wafer surface comprising:
formulating an abrasive mixture by mixing diamond particles and silica particles in a solution, such that the formulation is sufficient for smoothing a polar material surface that is polished with the abrasive mixture, wherein the abrasive mixture has a diamond/silica volume ratio that is selected to substantially minimize the surface roughness of the polished polar material surface;

providing a wafer surface of the polar material by detaching a layer from the wafer to expose said surface; and

polishing the wafer surface with the abrasive mixture to obtain a desired roughness that is sufficient for molecular bonding to another polished substrate surface.

23. (New) The method of claim 22, further comprising performing an ultrafinishing polishing on the polished surface to improve the surface for molecular bonding to another polished substrate surface.